# ANTIDEGRDATION PROCEDURE USING THE EXISTING RULES FOR THE GREAT LAKES BASIN

## Introduction

There are three conditions that must be satisfied before a proposed lowering of water quality for a non-BCC is considered to be a significant lowering of water quality. First, there must be a new or increased permit limit for a pollutant or pollutant parameter. Second, the new or increased permit limit must result in a calculated increase in the ambient concentration of the pollutant or pollutant parameter outside of the designated mixing zone, where applicable, in the receiving water body. Third, the new or increased permit limit must result in a lowering of water quality that is greater than a de minimis lowering of water quality.

### STEP 1: NEW OR INCREASED PERMIT LIMIT BASED ON (327 IAC 5-2-11.3(b)(1)(B)) and (327 IAC 5-2-11.5)

327 IAC 5-2-11.3(b)(1)(B) state that there must be a proposed new or increased permit limit for a pollutant or pollutant parameter for there to be a significant lowering of water quality.

The procedure for determining when to require an effluent limit for a new or increased discharge is based on 327 IAC 5-2-11.5. 327 IAC 5-2-11.5 states: If the commissioner determines that a pollutant or pollutant parameter (either conventional, non-conventional, a toxic substance, or whole effluent toxicity (WET)) is or may be discharged into the Great Lakes system at a level that will cause, have the reasonable potential to cause, or contribute to an excursion above any applicable narrative criterion or numeric water quality criterion or value under 327 IAC 2-1.5, the commissioner shall incorporate water quality-based effluent limitations (WQBELs) in an NPDES permit that will ensure compliance with the criterion or value.

The procedure found in 5-2-11.5 is used to determine if there is a reasonable potential to cause or contribute to an excursion above any applicable narrative or numeric water quality criterion. The reasonable potential to exceed evaluation is conducted by comparing the projected effluent quality (PEQ) to the projected effluent limit (PEL). If the PEQ is greater than the PEL, a water quality based effluent limit (WQBEL) is required.

The PEL is the WQBEL calculated using the default mixing zone. The default mixing zone for the Great Lakes Basin is 25% of the stream design flow and the default mixing zone for the remainder of the state is 50% of the stream design flow. The WQBEL calculated using a percentage of the stream design flow as the mixing zone is equivalent to the limit represented by the same percentage of the unused loading capacity being allocated to the new or increased discharge.

### STEP 2: CALCULATED CONCENTRATION INCREASE IN THE RECEIVING WATER BODY BASED ON (327 IAC 5-2-11.3(b)(1)(B)(i))

The new or increased permit limit must result in a calculated increase in the ambient concentration of the pollutant or pollutant parameter outside of the designated mixing zone, where applicable, in

the receiving water body for there to be a significant lowering of water quality. This will occur if the new or increased permit limit results in a proposed downstream concentration of the pollutant or pollutant parameter ($C_{sp}$) that is greater than the existing downstream concentration of the pollutant or pollutant parameter ($C_{se}$). The following calculation shall be used to make this determination:

If $C_{sp} > C_{se}$, then there is a calculated increase in the downstream concentration of the pollutant or pollutant parameter.

$$C_{sp} = \frac{(C_p * Q_p) + (C_b * Q_s1)}{Q_p + Q_s1}$$ (Proposed downstream concentration of the pollutant or pollutant parameter.)

$$C_{se} = \frac{(C_e * Q_e) + (C_b * Q_s1)}{Q_e + Q_s1}$$ (Existing downstream concentration of the pollutant or pollutant parameter.)

$C_p$ = Proposed monthly average concentration limit (in mg/l).

$C_e$ = Existing monthly average concentration limit (in mg/l).

- If the existing permit does not contain a monthly average concentration limit for the pollutant or pollutant parameter, but does contain a daily maximum concentration limit, the daily maximum limit shall be used.
- If the existing permit does not contain a concentration limit for the pollutant or pollutant parameter, but does contain a monthly average mass limit (or daily maximum if no monthly average), the mass limit shall be converted into a concentration limit by dividing the mass limit by the existing effluent flow, $Q_e$, defined below and by 8.3454 (conversion factor).
- If the existing permit does not contain an effluent limit for the pollutant or pollutant parameter, and the pollutant or pollutant parameter is present in the discharge, then $C_e$ is equal to the monthly average projected effluent quality (PEQ) calculated under 327 IAC 5-2-11.5(b)(1)(B).
- If the facility is an existing discharger but does not have an NPDES permit for the discharge (unpermitted discharge), then $C_e$ is equal to zero (0).
- If the pollutant or pollutant parameter is not currently discharged (all new facilities would fit this category), then $C_e$ is equal to zero (0).

$Q_p$ = Proposed effluent flow (in mgd). This is the flow used in the calculation of the wasteload allocation for the new, renewed or modified permit. (327 IAC 5-2-11.4(a)(9)).

$Q_e$ = Existing effluent flow (in mgd). This flow shall be determined for the existing facility in accordance with 327 IAC 5-2-11.4(a)(9). This flow will be equal to the proposed effluent flow if there are no planned changes at the facility.

$Q_{s1}$ = The stream design flow used in the calculation of the wasteload allocation that is the basis of the water quality-based effluent limits (WQBELs) for the new, renewed or modified permit (in mgd). (327 IAC 5-2-11.4(b))

$C_b$ = Background concentration used in the calculation of the wasteload allocation for

the new, renewed or modified permit (in mg/l). (327 IAC 5-2-11.4(a)(8))

## STEP 3: LOWERING OF WATER QUALITY GREATER THAN DE MINIMIS BASED ON (327 IAC 5-2-11.3(b)(1)(B)(ii))

The proposed lowering of water quality must be greater than de minimis for there to be a significant lowering of water quality. A lowering is greater than de minimis if the proposed increase in mass discharged of the pollutant or pollutant parameter is greater than or equal to ten percent (10%) of the unused loading capacity or if less than ten percent (10%) of the total loading capacity will remain unused after the increase.

### A. Proposed Increase in Mass Discharged Is Greater than or Equal to 10% of the Unused Loading Capacity

If $(M_P - M_e) \geq 0.10 * (ULC)$, then the proposed increase in mass discharged of the pollutant or pollutant parameter is greater than de minimis.

$M_P$ = Proposed monthly average mass limit (in lbs/day).

$M_e$ = Existing monthly average mass limit (in lbs/day).

- If the existing permit does not contain a monthly average mass limit for the pollutant or pollutant parameter, but does contain a daily maximum mass limit, the existing daily maximum limit shall be used.
- If the existing permit does not contain a mass limit for the pollutant or pollutant parameter, but does contain a monthly average concentration limit (or daily maximum if no monthly average), the concentration limit shall be converted into a mass limit using the existing effluent flow, $Q_e$, defined in Part III, above.
- If the existing permit does not contain an effluent limit for the pollutant or pollutant parameter, and the pollutant or pollutant parameter is present in the discharge, $M_e$ shall be set equal to the actual monthly average mass discharged. The actual monthly average mass discharged shall be calculated by multiplying the monthly average PEQ calculated under 327 IAC 5-2-11.5(b)(1)(B) by the existing effluent flow, $Q_e$, defined in Part III, above and by 8.3454 (conversion factor).
- If the facility is an existing discharger but does not have an NPDES permit for the discharge (unpermitted discharge), then $M_e$ is equal to zero (0).
- If the pollutant or pollutant parameter is not currently discharged (all new facilities would fit this category), then $M_e$ is equal to zero (0).

ULC = The unused loading capacity. See C(2), below.

### B. Less than 10% of the Total Loading Capacity Will Remain Unused after the Proposed Increase

If $TLC - [M_P + (C_b * Q_{s2} * CF)] < 0.10 * (TLC)$, then the proposed increase is greater than de minimis.

TLC = The total loading capacity (in lbs/day). See C(1), below.

$M_p$ = See A, above.

$C_b$ = See Step 2, above.

$Q_{s2}$ = Stream design flow used to calculate the TLC (in mgd). See C(1), below.

CF = 8.3454. (Conversion factor)

## C. Total Loading Capacity and Unused Loading Capacity

### (1) Total Loading Capacity (TLC)

(a) Calculate the TLC for all applicable criteria as follows:

$$TLC = WQC * (Q_e + Q_{s2}) * CF$$

WQC = Applicable water quality criterion or value (in mg/l).

$Q_e$ = See Step 2, above.

$Q_{s2}$ = Applicable stream design flow for the WQC (in mgd). (327 IAC 5-2-11.4(b)).

CF = 8.3454. (Conversion factor)

(b) The lowest TLC calculated in (a) shall be the TLC used in this procedure.

### (2) Unused Loading Capacity (ULC)

$$ULC = TLC - [M_e + (C_b * Q_{s2} * CF)]$$

$M_e$ = See A, above.

$C_b$ = See Step 2, above.

$Q_{s2}$ = Stream design flow used to calculate the TLC (in mgd). See C(1), above.

CF = 8.3454. (Conversion factor)

## STEP 4: PERMIT LIMITS THAT WILL NOT CAUSE A SIGNIFICANT LOWERING

If a new or increased permit limit was determined to cause a significant lowering of water quality above, adjusted permit limits can be calculated that do not cause a significant lowering of water quality. The discharger will be given the choice of accepting the adjusted permit limits or doing an antidegradation demonstration and potentially receiving the proposed permit limits. This procedure involves calculating a concentration limit that will not result in a calculated increase in the downstream concentration of the pollutant or pollutant parameter and a mass limit that will not result in an increase in mass discharged of the pollutant or pollutant parameter that is greater than a de minimis increase. The mass limit will be converted into a concentration limit and the higher of the two concentration limits will be used as the adjusted monthly average concentration limit. The adjusted monthly average mass limit will be calculated from the adjusted monthly average concentration limit. The calculations are as follows:

### A. Calculated Concentration in the Receiving Water Body Does Not Increase

If $C_p = C_{se} + [(Q_{s1}/Q_p) * (C_{se} - C_b)]$, then there is not a calculated increase in the downstream concentration of the pollutant or pollutant parameter. See III, above, for the inputs to this calculation.

### B. Lowering of Water Quality that is De minimis

To be a de minimis lowering of water quality, the proposed increase in mass discharged must be less than 10% of the unused loading capacity and at least 10% of the total loading capacity must remain unused after the proposed increase. Two values for $M_p$ that satisfy these conditions must be calculated. The minimum of these values shall be used to calculate $C_p$. The calculations are as follows (see III and IV, above, for the inputs to the calculations):

(1) If $M_p = M_e + .0999 * (ULC)$, then the proposed increase in mass discharged is less than 10% of the unused loading capacity.

(2) If $M_p = TLC - [(.10 * (TLC)) + (C_b * Q_{s2} * CF)]$, then 10% of the total loading capacity remains unused after the proposed increase.

(3) $C_p = (\text{Minimum } M_p)/(Q_p * CF)$

### C. Adjusted Permit Limits

The maximum $C_p$ from A and B, above, is the adjusted monthly average concentration limit. The adjusted daily maximum concentration limit shall be calculated by multiplying the adjusted monthly average limit by the ratio of the proposed daily maximum limit to the proposed monthly average limit. The adjusted monthly average and daily maximum mass limits shall be calculated by multiplying the adjusted monthly average and daily maximum concentration limits by $Q_p$ and CF (See III and IV, above, for the values of $Q_p$ and CF, respectively.)